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Trout Lake
Lake County, Florida

(U.S.) National Eutrophication Survey, Corvallis, OR

Prepared for

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Dec 77

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

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REPORT
ON
TROUT LAKE
LAKE COUNTY
FLORIDA
EPA REGION IV
WORKING PAPER No. 278

WITH THE COOPERATION OF THE
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
AND THE
FLORIDA NATIONAL GUARD
DECEMBER, 1977

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Florida Department of Environmental Regulation for professional involvement and to the Florida National Guard for conducting the tributary sampling phase of the Survey.

Joseph W. Landers, Jr., Secretary of the Department of Environmental Regulation; John A Redmond, former Director of the Division of Planning, Technical Assistance, and Grants; and Dr. Tim S. Stuart, Chief of the Bureau of Water Quality, provided invaluable lake documentation and counsel during the survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

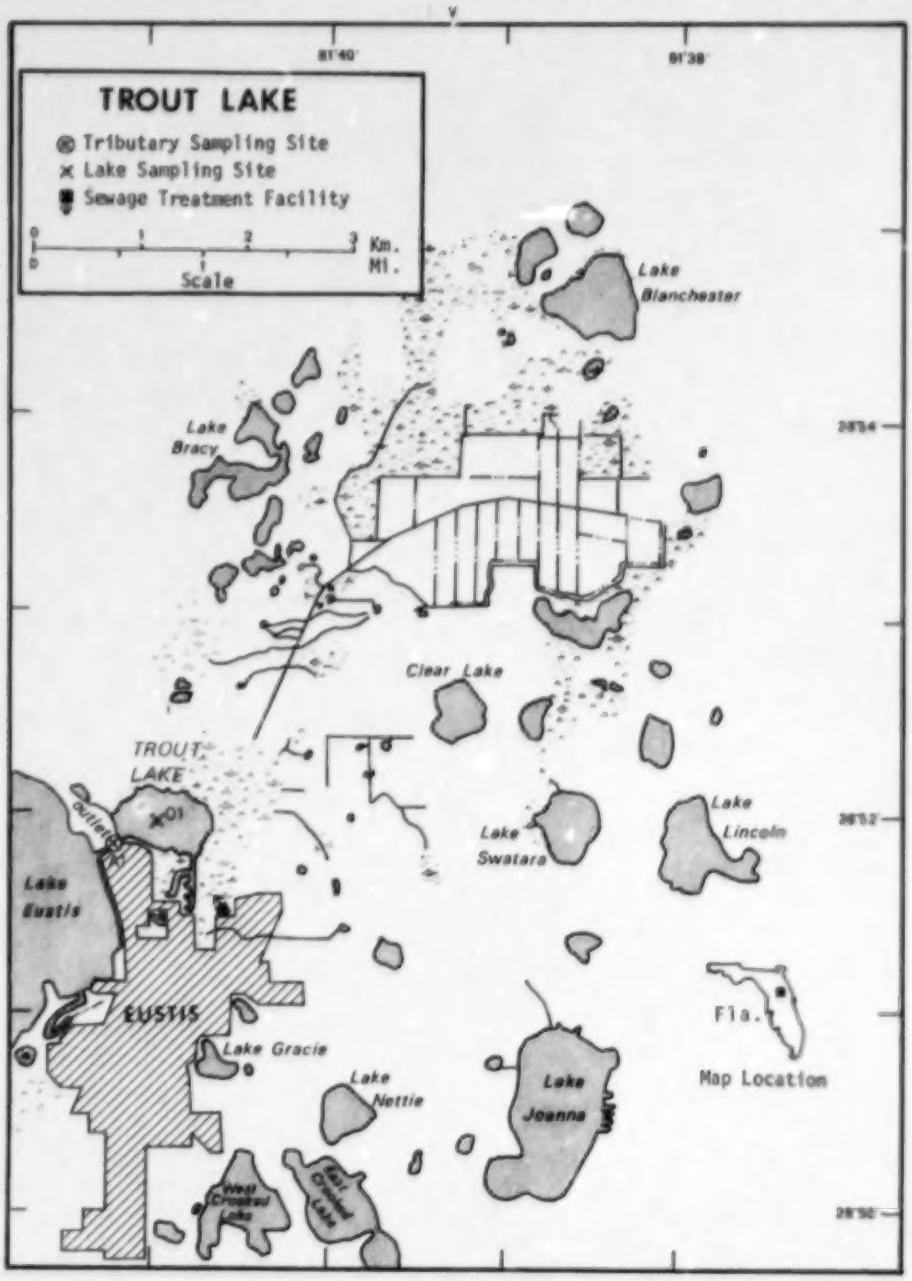
Major General Henry W. McMillan (Retired), then the Adjutant General of Florida, and Project Officer Colonel Hugo F. Windham, who directed the volunteer efforts of the Florida National Guard, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF FLORIDA

LAKE NAME	COUNTY
Alligator	Columbia
Apopka	Lake, Orange
Banana	Polk
Crescent	Flagler, Putnam
Doctors	Clay
Dora	Lake
East Tohopekaliga	Osceola
Effie	Polk
Eloise	Polk
George	Putnam, Volusia
Gibson	Polk
Glenada	Highlands
Griffin	Lake
Haines	Polk
Hancock	Polk
Horseshoe	Seminole
Howell	Orange, Seminole
Istokpoga	Highlands
Jessie	Polk
Jessup	Seminole
Kissimmee	Osceola
Lawne	Orange
Lulu	Polk
Marion	Polk
Minnehaha	Orange
Minneola	Lake
Monroe	Seminole, Volusia
Munson	Leon
Okeechobee	Glades, Hendry, Martin, Okeechobee, Palm Beach
Poinsett	Brevard, Orange, Osceola
Reedy	Polk
Seminole	Jackson, FL; Decatur, Seminole, GA
Seminole	Pinellas
South	Brevard
Talquin	Gadsden, Leon
Tarpon	Pinellas
Thonotosassa	Hillsborough
Tohopekaliga	Osceola
Trout	Lake
Weohyakapka	Polk
Yale	Lake


TROUT LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
0 1 2 3 Km.
0 1 MI.
Scale
81°40'
81°38'
28°34'
28°32'
28°30'
Lake Blanchester
Lake Bracy
Clear Lake
TROUT LAKE
01
Outlet
Lake Eustis
Lake Swatara
Lake Lincoln
EUSTIS
Lake Gracie
Lake Nettie
Lake Joanna
West Crooked Lake
East Crooked Lake
Fla.
Map Location

TROUT LAKE

STORET NO. 1242

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Trout Lake is hypereutrophic. It ranked 37th in overall trophic quality when the 41 Florida lakes sampled in 1973 were compared using a combination of six lake parameters*. Thirty-four of the lakes had less median total phosphorus, 37 had less median dissolved phosphorus and median inorganic nitrogen, 31 had less mean chlorophyll a, and 23 had greater mean Secchi disc transparency.

Survey limnologists observed extensive beds of water hyacinth along the shoreline.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Trout Lake was nitrogen limited at the time the sample was collected (03/12/73). The lake data indicate nitrogen limitation at the other sampling times as well.

C. Nutrient Controllability:

1. Point sources--It is estimated that the Eustis wastewater treatment plant contributed about 38% of the total phosphorus input and 39% of the total nitrogen input to Trout Lake during the sampling year. However, Trout Lake has no defined tributaries, and drainage non-point nutrient contributions were esti-

* See Appendix A.

mated from the measured outlet loads (i.e., outlet loads minus point-source and precipitation loads = drainage loads; see page 8).

The estimated sampling year phosphorus loading of more than 43 g/m^2 is about 60 times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading. However, Vollenweider's model probably is not applicable to water bodies with short hydraulic retention times, and the estimated mean hydraulic retention time of Trout Lake is only 13 days.

Advanced treatment or diversion of the Eustis effluent would reduce both the phosphorus and nitrogen inputs to the lake. However, because of the high concentrations of both nutrients in the lake during Survey sampling (see page 5 and Appendix D), it does not appear likely that point-source control would reduce the in-lake nutrient levels enough to result in a significant improvement in the trophic condition of Trout Lake.

2. Non-point sources--The estimated contributions of non-point sources amounted to nearly 62% of the total phosphorus and 61% of the total nitrogen inputs to Trout Lake.

The 1966 Eustis and Umatilla U.S.G.S. quadrangle maps indicate that swampland and urban drainage probably contribute significant amounts of nutrients to Trout Lake.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Morphometry††:

1. Surface area: 0.41 kilometers^2.
2. Mean depth: 1.5 meters.
3. Maximum depth: 2.7 meters.
4. Volume: 0.615 x 10^6 m^3.
5. Mean hydraulic retention time: 13 days (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
(None sampled)	-	-
Minor tributaries & immediate drainage -	62.2	**
Totals	62.2	-

2. Outlet -

Unnamed Stream A-1	62.6***	0.53

C. Precipitation****:

1. Year of sampling: 121.6 centimeters.
2. Mean annual: 132.1 centimeters.

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† Table of metric conversions--Appendix B.
†† Surface area from U.S.G.S. Eustis quadrangle map; depths estimated from soundings reported in Appendix D.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Indeterminate seepage; see page 9.
*** Includes area of lake.
**** See Working Paper No. 175.

III. WATER QUALITY SUMMARY

Trout Lake was sampled three times during 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from one or more depths at a single station on the lake (see map, page v). During each visit, a single depth-integrated (near bottom to surface) sample was collected for phytoplankton identification and enumeration, and a similar sample was collected for chlorophyll a analysis. During the first visit, a single 18.9-liter depth-integrated sample was taken for algal assays. The maximum depth sampled was 1.8 meters.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR TROUT LAKE
STORET CODE 1242

PARAMETER	1ST SAMPLING (3/12/73) 1 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (9/ 6/73) 1 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/ 5/73) 1 SITES RANGE	MEAN	MEDIAN
TEMP (C)	22.7 - 25.5	24.1	24.1	29.1 - 29.1	29.1	29.1	22.2 - 23.2	22.9	23.2
DISS OXY (MG/L)	2.1 - 2.1	2.1	2.1	9.2 - 9.2	9.2	9.2	4.2 - 7.2	5.7	5.7
CNDCTVY (MCROMO)	200. - 205.	203.	203.	214. - 214.	214.	214.	178. - 178.	178.	178.
PH (STAND UNITS)	7.9 - 8.6	8.2	8.2	7.9 - 7.9	7.9	7.9	6.8 - 7.0	6.9	6.9
TOT ALK (MG/L)	23. - 23.	23.	23.	34. - 34.	34.	34.	33. - 34.	34.	34.
TOT P (MG/L)	1.190 - 1.200	1.195	1.195	1.110 - 1.110	1.110	1.110	0.886 - 0.934	0.910	0.910
ORTHO P (MG/L)	1.040 - 1.050	1.045	1.045	0.970 - 0.970	0.970	0.970	0.710 - 0.860	0.785	0.785
NO2+NO3 (MG/L)	0.580 - 0.650	0.615	0.615	0.060 - 0.060	0.060	0.060	0.270 - 0.280	0.275	0.275
AMMONIA (MG/L)	0.250 - 0.410	0.330	0.330	0.080 - 0.080	0.080	0.080	0.180 - 0.380	0.280	0.280
KJEL N (MG/L)	2.300 - 2.600	2.450	2.450	2.800 - 2.800	2.800	2.800	2.300 - 2.300	2.300	2.300
INORG N (MG/L)	0.900 - 0.990	0.945	0.945	0.140 - 0.140	0.140	0.140	0.460 - 0.650	0.555	0.555
TOTAL N (MG/L)	2.880 - 3.250	3.065	3.065	2.860 - 2.860	2.860	2.860	2.570 - 2.580	2.575	2.575
CHLRPYL A (UG/L)	38.3 - 38.3	38.3	38.3	135.8 - 135.8	135.8	135.8	56.8 - 56.8	56.8	56.8
SECCHI (METERS)	0.8 - 0.8	0.8	0.8	0.6 - 0.6	0.6	0.6	0.8 - 0.8	0.8	0.8

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/12/73	1. Melosira sp.	2,391
	2. Oocystis sp.	1,413
	3. Dictyosphaerium sp.	1,304
	4. Microcystis sp.	1,159
	5. Cyclotella sp.	1,087
	Other genera	3,226
	Total	10,580
09/06/73	1. Melosira sp.	29,668
	2. Flagellates	6,568
	3. Centric diatoms	3,963
	4. Chroococcus sp.	3,624
	5. Gloeothece sp.	3,397
	Other genera	23,267
	Total	70,487
11/05/73	1. Centric diatoms	4,287
	2. Flagellates	3,810
	3. Melosira sp.	2,699
	4. Microcystis sp.	2,064
	5. Chroococcus sp.	1,667
	Other genera	11,001
	Total	25,528

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
03/12/73	1	38.3
09/06/73	1	135.8
11/05/73	1	56.8

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	1.040	0.974	30.5
0.050 P	1.090	0.974	30.7
0.050 P + 1.0 N	1.090	1.974	54.9
1.0 N	1.040	1.974	51.9

2. Filtered and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	1.040	0.964	26.5
0.050 P	1.090	0.964	25.4
0.050 P + 1.0 N	1.090	1.964	48.5
1.0 N	1.040	1.964	46.6

3. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity of Trout Lake was very high at the time the algal assay sample was collected (03/12/73). No significant growth response occurred in either assay when only orthophosphorus was added. However, the addition of only nitrogen resulted in yields significantly greater than those of the controls. These results indicate nitrogen was limiting at the time of sample collection.

The lake data also indicate nitrogen limitation; i.e., mean inorganic nitrogen to orthophosphorus ratios were less than 1 to 1 at all sampling times.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Florida National Guard collected monthly near-surface grab samples when possible from the outlet site indicated on the map (page v). Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Florida District Office of the U.S. Geological Survey for the outlet.

In this report, nutrient loads for the outlet were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*.

No streams flow directly into Trout Lake. An ungaged stream-canal system draining swampland discharges into a marshy area about 0.8 km north of the lake. From that point on, the channel becomes undefined, and the water reaches the lake by seepage. Therefore, the nutrient contributions of the drainage were estimated from the measured outlet loads, with the assumption that the total nutrient inputs were at least equal to the loads leaving the lake; i.e., the outlet loads minus the point-source and precipitation loads equal the drainage loads.

The operator of the Eustis wastewater treatment plant provided monthly effluent samples and corresponding flows.

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* See Working Paper No. 175.

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Eustis	8,200	trickling filter	2,996.5	Canal to Trout Lake

2. Known industrial - None

* Treatment plant questionnaire.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
None	-	-
b. Minor tributaries & immediate drainage (non-point load) -	10,995	61.4
c. Known municipal STP's -		
Eustis	6,895	38.5
d. Septic tanks* -	< 5	< 0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	20	0.1
Total	17,910	100.0

2. Outputs -

Lake outlet - Unnamed Stream A-1	17,910

3. Net annual P accumulation - ?

* Estimate based on four shoreline dwellings; see Work[illegible]g Paper No. 175.
** Brezonik and Shannon, 1971.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) - None	-	-
b. Minor tributaries & immediate drainage (non-point load) -	36,245	60.6
c. Known municipal STP's - Eustis	23,260	38.9
d. Septic tanks* -	45	< 0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	240	0.4
Total	59,790	100.0

2. Outputs -

Lake outlet - Unnamed Stream A-1 59,790

3. Net annual N accumulation - ?

* Estimate based on four shoreline dwellings; see Working Paper No. 175.
** Brezonik and Shannon, 1971.

D. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Note, however, that Florida lakes may be able to assimilate phosphorus at a somewhat higher level than that suggested by Vollenweider (Shannon and Brezonik, 1972).

Essentially, Vollenweider's "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	43.68	?	145.8	?

Vollenweider phosphorus loadings ($g/m^2/yr$) based on estimated mean depth and hydraulic retention time of Trout Lake:

"Dangerous" (eutrophic loading)	1.22
"Permissible" (oligotrophic loading)	0.61

V. LITERATURE REVIEWED

Brezonik, Patrick L. and Earl E. Shannon, 1971. Trophic state of lakes in north central Florida. Publ. No. 13, Water Resources Res. Ctr., U. of FL, Gainesville.

Shannon, Earl E., and Patrick L. Brezonik, 1972. Relationships between lake trophic state and nitrogen and phosphorus loading rates. Env. Sci. & Techn. 6 (8): 719-725.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLOR-A	19- MIN DO	MEDIAN DISS INORG P
1201	ALLIGATOR LAKE	0.026	0.200	474.000	67.733	13.100	0.200
1202	LAKE APOPKA	0.102	0.230	466.176	46.611	8.200	0.019
1203	LAKE BANANA	0.060	0.260	482.067	200.600	3.000	0.293
1206	LAKE CRESCENT	0.005	0.130	473.000	10.211	10.200	0.033
1207	DOCTORS LAKE	0.084	0.120	465.555	27.100	10.000	0.029
1208	LAKE DORA	0.102	0.240	462.059	54.478	7.400	0.022
1209	LAKE EFFIE	1.483	0.410	489.000	261.433	15.000	0.950
1210	LAKE GEORGE	0.129	0.165	484.308	35.000	11.000	0.063
1211	LAKE GIDSON	0.107	0.115	478.000	19.675	10.200	0.009
1212	GLENADA LAKE	0.136	0.165	454.167	27.667	14.700	0.072
1214	LAKE GRIFFIN	0.119	0.260	481.333	66.855	5.600	0.036
1215	LAKE HAINES	0.063	0.115	462.067	26.567	10.000	0.014
1217	LAKE HANCOCK	0.772	0.195	483.500	97.900	5.600	0.150
1219	LAKE HORSESHOE	0.036	0.130	454.000	12.067	11.500	0.023
1220	LAKE HOWELL	1.260	0.295	464.000	56.117	9.000	1.175
1221	LAKE ISTOKPOGA	0.031	0.120	484.222	6.594	8.000	0.010
1223	LAKE JESSUP	0.497	0.290	487.000	76.550	7.000	0.299
1224	LAKE KISSIMMEE	0.034	0.145	483.667	24.142	8.000	0.007
1227	LAKE LIRLU	1.490	1.005	483.000	276.500	14.300	1.030
1228	LAKE MARION	0.044	0.260	468.833	29.967	7.000	0.016
1229	LAKE MINNEHAHA	0.034	0.060	435.000	8.733	7.700	0.012
1230	LAKE MINNEOLA	0.018	0.070	486.333	3.333	7.400	0.004
1231	LAKE MONROE	0.140	0.300	474.555	14.225	10.000	0.129
1232	LAKE OREECHOBEE	0.063	0.185	472.300	14.529	9.000	0.010
1234	LAKE POINSETT	0.085	0.150	484.000	6.500	10.600	0.021
1236	LAKE REEDY	0.031	0.330	488.500	34.837	10.000	0.000
1238	LAKE SOUTH	0.074	0.130	484.000	23.167	9.000	0.029
1239	LAKE TALQUIN	0.005	0.290	462.167	4.483	14.400	0.031

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	SSD-MEAN SEC	MEAN CHLOPA	19-MIN DO	MEDIAN DISS ORTHO P
1240	LAKE THONOTOSASSA	0.095	0.095	480.167	37.780	10.280	0.565
1241	LAKE TOHOPEKALIGA	0.246	0.280	472.917	38.033	10.580	0.192
1242	TROUT LAKE	1.110	0.650	472.880	78.987	12.980	0.970
1243	LAKE WEOHYAKAPKA	0.007	0.080	456.667	7.767	8.280	0.011
1246	LAKE YALE	0.027	0.160	441.888	25.367	7.680	0.014
1247	LAKE MUNSON	1.075	0.975	406.667	140.317	12.280	0.892
1248	LAKE SEMINOLE	0.234	0.175	473.833	102.800	6.680	0.020
1249	LAKE LAWNE	7.560	1.260	494.667	94.980	10.480	0.117
1250	LAKE TARPON	0.041	0.070	485.889	6.867	9.000	0.027
1252	LAKE ELOISE	0.486	0.170	465.333	78.233	12.280	0.339
1256	LAKE JESSIE	0.051	0.090	452.667	28.380	10.880	0.011
1261	EAST LAKE TOHOPEKALIGA	0.042	0.070	440.833	5.167	9.480	0.007
1264	PAYNE'S PRAIRIE LAKE 140	1.260	0.140	470.000	88.280	7.480	1.210

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SES	MEAN CHLOPA	15- MIN 2D	MEDIAN DISS ORTHO P	INDEX NO
1201	ALLIGATOR LAKE	25 (101)	29 (119)	30 (121)	18 (71)	10 (41)	18 (71)	135
1202	LAKE APOPKA	50 (201)	30 (151)	10 (41)	20 (191)	74 (291)	70 (281)	290
1203	LAKE BANANA	23 (91)	29 (101)	20 (81)	5 (21)	100 (401)	23 (91)	200
1206	LAKE CRESCENT	65 (261)	70 (271)	33 (131)	80 (321)	46 (181)	58 (231)	346
1207	DOCTORS LAKE	68 (241)	74 (301)	68 (241)	55 (221)	26 (121)	56 (221)	341
1208	LAKE DORA	53 (211)	35 (141)	18 (71)	33 (131)	98 (251)	68 (271)	247
1209	LAKE EFFIE	5 (21)	15 (61)	3 (11)	3 (11)	0 (01)	10 (41)	31
1210	LAKE GEORGE	49 (191)	56 (231)	48 (191)	43 (171)	23 (91)	43 (171)	356
1211	LAKE GIBSON	40 (161)	81 (321)	45 (181)	70 (281)	48 (181)	40 (161)	324
1212	GLENADA LAKE	43 (171)	54 (211)	85 (341)	53 (211)	3 (11)	38 (151)	276
1214	LAKE GRIFFIN	48 (191)	29 (101)	23 (91)	30 (121)	95 (381)	48 (190)	273
1215	LAKE HAINES	70 (281)	81 (321)	75 (301)	58 (231)	34 (121)	78 (311)	306
1217	LAKE HANCOCK	18 (71)	43 (171)	13 (51)	13 (51)	98 (391)	28 (111)	213
1219	LAKE HORSESHOE	43 (171)	78 (271)	60 (321)	78 (211)	28 (81)	65 (261)	406
1220	LAKE HOWELL	11 (41)	23 (91)	69 (271)	35 (141)	58 (231)	3 (11)	201
1221	LAKE ISTOKPOGA	85 (341)	76 (301)	65 (261)	93 (371)	69 (271)	89 (351)	477
1222	LAKE JESSUP	28 (111)	18 (71)	5 (21)	25 (101)	83 (321)	35 (181)	100
1224	LAKE KISSIMMEE	98 (391)	63 (251)	73 (291)	65 (261)	65 (251)	99 (391)	425
1227	LAKE LULU	3 (11)	3 (11)	15 (61)	0 (01)	0 (11)	5 (21)	34
1228	LAKE MARION	78 (311)	29 (101)	53 (211)	48 (201)	83 (321)	73 (291)	306
1229	LAKE MINNEHAHA	84 (351)	91 (361)	95 (381)	85 (341)	78 (311)	80 (321)	547
1230	LAKE MINNEOLA	100 (401)	98 (391)	98 (391)	100 (401)	98 (351)	93 (371)	479
1231	LAKE MONROE	38 (151)	15 (61)	28 (111)	75 (301)	26 (101)	33 (131)	215
1232	LAKE OREECHOBEE	68 (271)	45 (181)	40 (161)	73 (291)	53 (211)	88 (351)	384
1234	LAKE POINSETT	58 (231)	68 (241)	58 (201)	95 (381)	34 (121)	45 (181)	342
1236	LAKE REEDY	95 (381)	13 (51)	55 (221)	45 (181)	34 (121)	95 (381)	331
1238	LAKE SOUTH	63 (251)	70 (271)	69 (271)	68 (271)	58 (231)	56 (221)	348
1239	LAKE TALQUIN	55 (221)	20 (81)	78 (311)	83 (331)	5 (21)	53 (211)	204

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLOPA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1240	LAKE THONOTOSASSA	20 (8)	85 (34)	58 (23)	40 (16)	48 (18)	15 (6)	266
1241	LAKE TOHOPEKALIGA	33 (13)	40 (16)	38 (15)	48 (19)	40 (16)	30 (12)	229
1242	TROUT LAKE	15 (6)	8 (3)	43 (17)	23 (9)	13 (5)	8 (3)	110
1243	LAKE WEOHYAKAPKA	75 (30)	91 (36)	83 (33)	88 (35)	74 (29)	84 (33)	495
1246	LAKE YALE	98 (39)	58 (23)	90 (36)	63 (25)	83 (32)	75 (30)	467
1247	LAKE MUNSON	8 (3)	5 (2)	8 (3)	8 (3)	16 (6)	13 (5)	58
1248	LAKE SEMINOLE	35 (14)	48 (19)	35 (14)	10 (4)	69 (27)	63 (25)	280
1249	LAKE LAWNE	0 (0)	0 (0)	0 (0)	20 (8)	43 (17)	35 (14)	98
1250	LAKE TARPON	83 (33)	98 (38)	100 (40)	90 (36)	60 (23)	60 (24)	491
1252	LAKE ELOISE	30 (12)	50 (20)	63 (25)	28 (11)	16 (6)	20 (8)	207
1258	LAKE JESSIE	73 (29)	88 (35)	88 (35)	60 (24)	26 (10)	84 (33)	419
1261	EAST LAKE TOHOPEKALIGA	80 (32)	98 (38)	93 (37)	98 (39)	55 (22)	99 (39)	523
1264	PAYNE'S PRAIRIE LAKE (NO	11 (4)	65 (26)	25 (10)	15 (6)	90 (35)	0 (0)	206

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1230	LAKE MINNEOLA	579
2	1261	EAST LAKE TOHOPEKALIGA	523
3	1229	LAKE MINNEHAHA	517
4	1243	LAKE WEOHYAKAPKA	495
5	1250	LAKE TARPON	491
6	1221	LAKE ISTOKPOGA	477
7	1246	LAKE YALE	467
8	1224	LAKE KISSIMMEE	455
9	1258	LAKE JESSIE	419
10	1219	LAKE HORSESHOE	406
11	1215	LAKE HAINES	396
12	1238	LAKE SOUTH	386
13	1232	LAKE OKEECHOBEE	368
14	1228	LAKE MARION	366
15	1206	LAKE CRESCENT	346
16	1234	LAKE POINSETT	342
17	1207	DOCTORS LAKE	341
18	1236	LAKE REEDY	337
19	1211	LAKE GIBSON	324
20	1208	LAKE DORA	297
21	1239	LAKE TALQUIN	294
22	1202	LAKE APOPKA	280
23	1212	GLENADA LAKE	276
24	1214	LAKE GRIFFIN	273
25	1240	LAKE THONOTOSASSA	266
26	1248	LAKE SEMINOLE	260
27	1210	LAKE GEORGE	256
28	1241	LAKE TOHOPEKALIGA	229

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	1231	LAKE MONROE	215
30	1217	LAKE HANCOCK	213
31	1252	LAKE ELOISE	207
32	1264	PAYNE'S PRAIRIE LAKE (NO	206
33	1220	LAKE HOWELL	201
34	1203	LAKE BANANA	200
35	1223	LAKE JESSUP	184
36	1201	ALLIGATOR LAKE	130
37	1242	TROUT LAKE	110
38	1249	LAKE LAWNE	98
39	1247	LAKE MUNSON	58
40	1227	LAKE LULU	34
41	1209	LAKE EFFIE	31

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 - cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR FLORIDA 8/25/75

LAKE CODE 1242 TROUT LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 62.2

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1242A1	62.2	0.40	0.51	0.79	0.57	0.17	0.17	0.42	0.74	1.02	0.79	0.48	0.34	0.53
1242ZZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 62.2
SUM OF SUB-DRAINAGE AREAS = 0.0
TOTAL FLOW IN = 0.0
TOTAL FLOW OUT = 6.40

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1242A1	3	73	0.33	17	0.25				
	4	73	0.42	8	0.71				
	5	73	0.06	20	0.04				
	6	73	0.14	18	0.05				
	7	73	0.11						
	8	73	0.29						
	9	73	0.46	15	0.0				
	10	73	0.37						
	11	73	0.08						
	12	73	0.15	9	0.09				
	1	74	0.17	6	0.24				
	2	74	0.07	3	0.08				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/08/25

124201
28 51 58.0 081 40 59.0
TROUT LAKE
12069 FLORIDA

11EPALES
3

2111202
0009 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	15	0000	25.5		30	205	8.60	23	0.250	2.600	0.650	1.050
	15	0005	22.7	2.1		200	7.90	23	0.410	2.300	0.580	1.040
73/09/06	11	0000	29.1	9.2	22	214	7.90	34	0.080	2.800	0.060	0.970
73/11/05	14	0000	23.2		32	178	7.00	33	0.180	2.300	0.280	0.710
	14	0001	23.2	7.2		178						
	14	0006	22.2	4.2		178	6.80	34	0.380	2.300	0.270	0.860

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	15	0000	1.190	38.3
	15	0005	1.200	
73/09/06	11	0000	1.110	135.8
73/11/05	14	0000	0.886	56.8
	14	0006	0.934	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/08/25

1242A1
28 52 00.0 081 41 00.0
UNNAMED TRIBUTARY
12097 7.5 EUSTIS
O/TROUT LAKE
ST HWY 19 BRDG.
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/17	09 15		0.300	2.800	0.220	0.645	0.860
73/04/08	13 50		0.315	2.700	0.105	0.840	1.050
73/05/20	10 30		0.160	2.300	0.054	0.740	0.890
73/06/18	10 30		0.036	7.700	0.160	0.700	0.880
73/09/15	09 00		0.020	2.100	0.044	0.900	1.010
73/12/09	10 40		2.760	1.200	0.024	0.970	1.050
74/01/06	11 05		0.700	2.300	0.200	1.100	1.250
74/02/03	14 20		1.120	1.200	0.360	1.150	1.325

28

STORET RETRIEVAL DATE 75/08/25

12420A TF1242DA P008200
28 51 30.0 081 40 40.0
EUSTIS
12097 7.5 EUSTIS
D/TROUT LAKE
TROUT LAKE
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/02/22	11 00		3.300	38.000	17.400	5.700	7.500	0.811	0.808
73/03/30	10 15		4.300	28.000	14.800	5.450	6.600	0.780	0.783
73/04/30	10 30		5.500	15.600	7.400	5.580	6.600	0.712	0.781
73/05/31	14 50		1.580	16.800	11.500	4.100	6.300	0.725	0.732
73/06/29	10 15		1.800	9.700	5.100	2.950	4.700	0.850	0.765
73/07/31	11 00		3.000	11.500	6.800	3.200	4.400	0.789	0.779
73/08/31	14 20			13.800	5.900	3.800	5.500	0.850	0.868
73/09/30	16 20		3.800	12.800	7.300	4.500	6.100	0.870	0.884
73/11/30	16 00		4.300	20.000	9.300	4.400	8.200	0.752	0.707
73/12/28	11 30		4.600	21.000	9.600	4.700	7.400	0.802	0.797
74/01/31	09 00		0.440	13.000	0.670	5.000	6.400	0.834	0.802
74/02/28	10 15		5.040	13.000	7.500	5.000	6.200	0.800	0.793